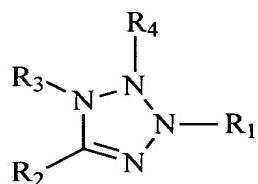


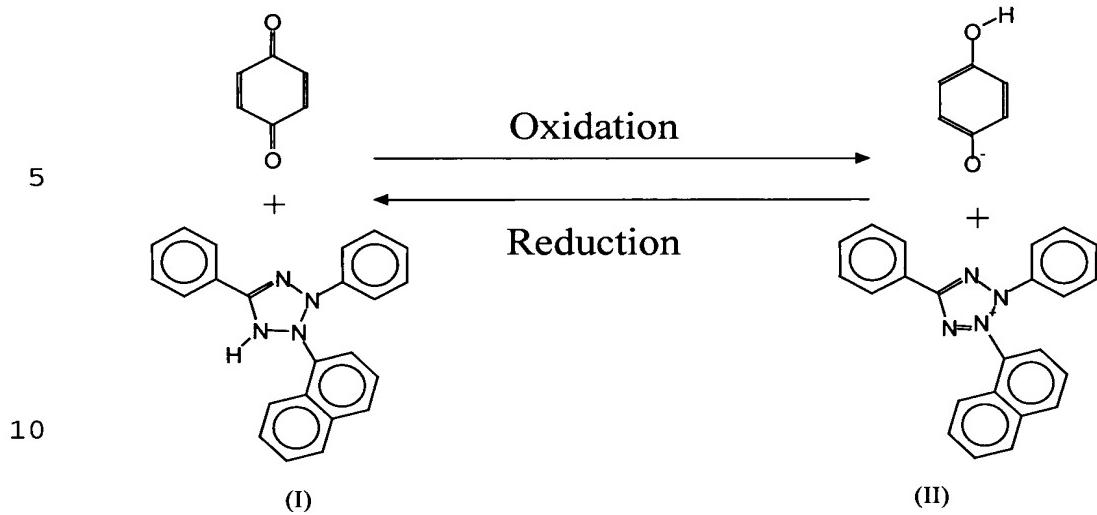
CLAIMSWhat Is Claimed Is:

- 5        1. An electrochemically-activated optical switch comprising a molecular system configured between a pair of electrodes, said molecular system including at least one organic non-polymeric molecule that changes color when oxidized or reduced by an electric current.
- 10        2. The optical switch of Claim 1 wherein said organic non-polymeric molecule comprises a substituted tetrazole.
- 15        3. The optical switch of Claim 2 wherein said substituted tetrazole is represented by the formula



where R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> are independently H, alkyls, or aryls and the ring carbon is in the 3-position.

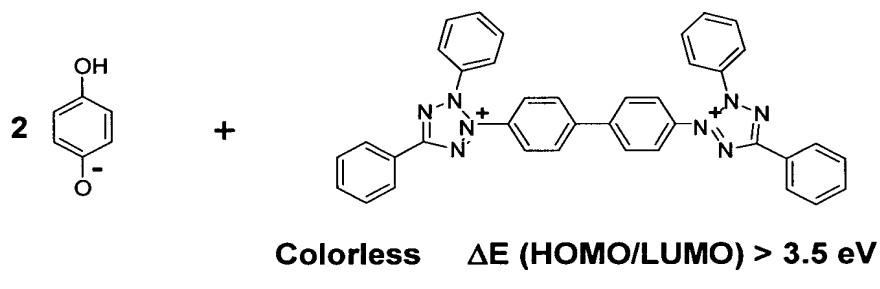
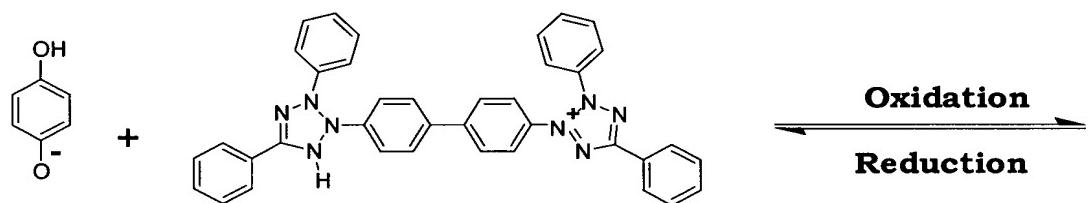
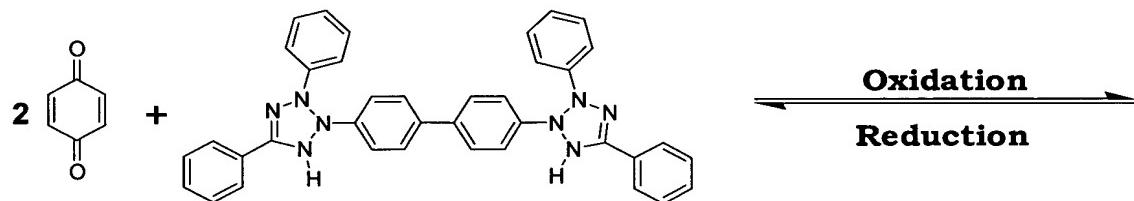
- 20        4. The optical switch of Claim 3 wherein any two of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> are alkyls and/or aryls, and the remainder hydrogen.
- 25        5. The optical switch of Claim 3 wherein the ring carbon is in the 2-position.
6. The optical switch of Claim 3 wherein said molecular system comprises:



wherein (I) is purple and has a  $\Delta E_{\text{HOMO/LUMO}} = 2 \text{ eV}$  and wherein (II) is colorless and has a  $\Delta E_{\text{HOMO/LUMO}} > 3.5 \text{ eV}$ .

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7. The optical switch of Claim 3 wherein said molecular system comprises:



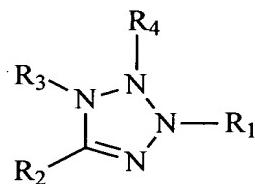
5 wherein (III) is blue and as a  $\Delta E_{\text{HOMO/LUMO}} = 1.85$  eV, wherein (IV) is magenta and has a  $\Delta E_{\text{HOMO/LUMO}} = 2.35$  eV, and wherein (V) is colorless and has a  $\Delta E_{\text{HOMO/LUMO}} > 3.5$  eV.

8. A molecular system configured between a pair of electrodes, said molecular system including at least one organic non-polymeric molecule that changes color when oxidized or reduced by an electric current.

5        9. The molecular system of Claim 8 wherein said organic non-polymeric molecule comprises a substituted tetrazole.

10      10. The molecular system of Claim 9 wherein said substituted tetrazole is represented by the formula

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where R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> are independently H, alkyls, or aryls and the ring carbon is in the 3-position.

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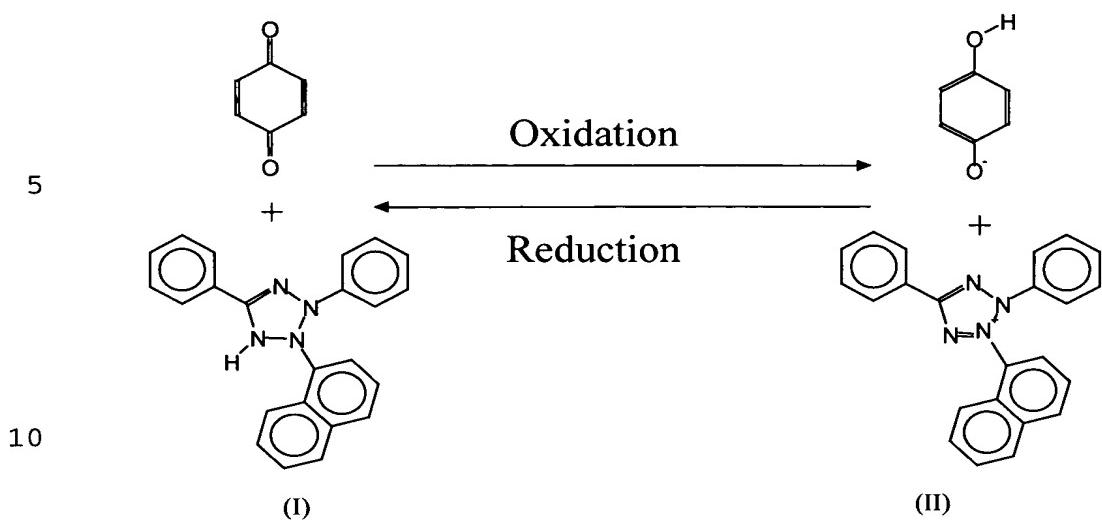
11. The molecular system of Claim 10 wherein any two of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> are alkyls and/or aryls, and the remainder hydrogen.

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12. The molecular system of Claim 10 wherein the ring carbon is in the 2-

position.

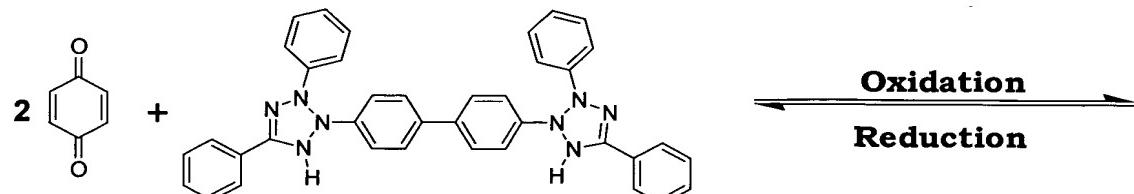
13. The molecular system of Claim 10 wherein said molecular system comprises:



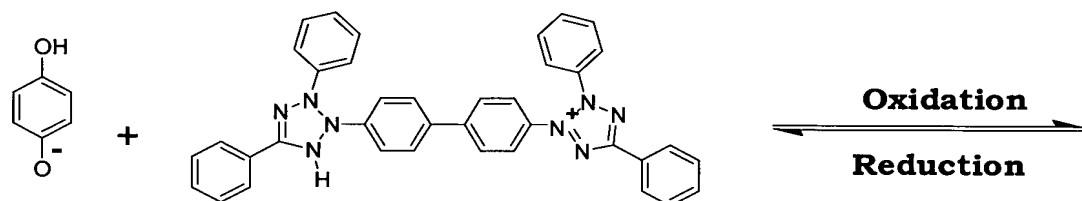
wherein (I) is purple and has a  $\Delta E_{\text{HOMO/LUMO}} = 2$  eV and wherein (II) is colorless and has a  $\Delta E_{\text{HOMO/LUMO}} > 3.5$  eV.

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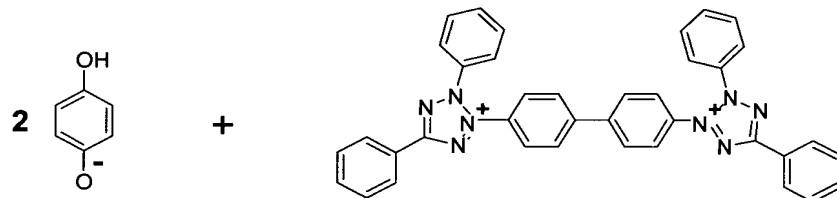
14. The molecular system of Claim 10 wherein said molecular system comprises:



**Blue       $\Delta E$  (HOMO/LUMO) = 1.85 eV**



**Magenta       $\Delta E$  (HOMO/LUMO) = 2.35 eV**



**Colorless       $\Delta E$  (HOMO/LUMO) > 3.5 eV**

- 5 wherein (III) is blue and as a  $\Delta E_{\text{HOMO/LUMO}} = 1.85$  eV, wherein (IV) is magenta and has a  $\Delta E_{\text{HOMO/LUMO}} = 2.35$  eV, and wherein (V) is colorless and has a  $\Delta E_{\text{HOMO/LUMO}} > 3.5$  eV.